UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2003/00113

July 1, 2003

Mr. Lawrence Evans
U.S. Army Corps of Engineers, Portland District
ATTN: John Barco
P.O. Box 2946
Portland, OR 97208-2946

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation on Construction of an Elevated Conveyor and Loading Dock by Morse Brothers, Inc., River Mile 82.6, Columbia River, Columbia County, Oregon (Corps. No. 200001020)

Dear Mr. Evans:

Enclosed is a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of construction of an elevated conveyor and loading dock by Morse Brothers, Inc., river mile 82.6, Columbia River, Columbia County, Oregon. NOAA Fisheries concludes in this Opinion that the proposed action is not likely to jeopardize the continued existence of Snake River (SR) sockeye salmon (*Oncorhynchus nerka*), SR fall chinook salmon (*O. tshawytscha*), SR spring/summer chinook salmon, Upper Columbia River (UCR) spring-run chinook salmon, Lower Columbia River (LCR) chinook salmon, Upper Willamette River (UWR) chinook salmon, Columbia River chum salmon (*O. keta*), SR steelhead (*O. mykiss*), UCR steelhead, Middle Columbia River steelhead, UWR steelhead, and LCR steelhead, or destroy or adversely modify designated critical habitat(s) of Snake River stocks. As required by section 7 of the ESA, we include reasonable and prudent measures with non-discretionary terms and conditions that are necessary to minimize the potential for incidental take associated with this action.

This document also serves as consultation on essential fish habitat (EFH) for chinook salmon (O. tshawytscha) and coho salmon (*O. kisutch*) and starry flounder (*Platyichthys stellatus*) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation Management Act and its implementing regulations at 50 CFR Part 600.

Please direct any questions regarding this consultation to Christy Fellas of my staff in the Oregon Habitat Branch at 503.231.2307.

Sincerely,

for Michael R Course

D. Robert Lohn
Regional Administrator

Endangered Species Act - Section 7 Consultation
Biological Opinion

&

Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Construction of an Elevated Conveyor and Loading Dock by Morse Brothers. Inc.,
River Mile 82.6, Columbia River, Columbia County, Oregon
(Corps No. 200001020)

Agency:	U.S. Army Corps of Engineers
Consultation Conducted By:	NOAA's National Marine Fisheries Service, Northwest Region
Date Issued:	July 1, 2003
Issued by:	F.r Michael R Crowe D. Robert Lohn Regional Administrator
Refer to:	**2003/00113**

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1. INTRODUCTION

1.1 Background and Consultation History

On February 7, 2003, NOAA's National Marine Fisheries Service (NOAA Fisheries) received a letter from the U.S. Army Corps of Engineers (COE) requesting formal consultation pursuant to the Endangered Species Act (ESA) for the issuance of a permit under section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act to Morse Brothers Inc. (Morse Bros.) for the construction of a proposed elevated conveyor and loading dock at Columbia River mile 82.6, Columbia County, Oregon. The COE determined the proposed action was likely to adversely affect the following ESA listed species: Snake River (SR) sockeye salmon (*Oncorhynchus nerka*), SR fall chinook salmon (*O. tshawytscha*), SR spring/summer chinook salmon, Upper Columbia River (UCR) spring-run chinook salmon, Lower Columbia River (LCR) chinook salmon, Upper Willamette River (UWR) chinook salmon, Columbia River chum salmon (*O. keta*), SR steelhead (*O. mykiss*), UCR steelhead, Middle Columbia River (MCR) steelhead, UWR steelhead, and LCR steelhead.

Species' information references, listing dates and take prohibitions are listed in Table 1. The objective of this Opinion is to determine whether the proposed action is likely to jeopardize the continued existence of the ESA listed species for these species, and to explain why NOAA Fisheries believes the proposed action will adversely effect essential fish habitat (EFH). This consultation is conducted pursuant to section 7(a)(2) of the ESA and its implementing regulations, 50 CFR 402.

1.2 Proposed Action

Morse Bros. proposes to construct an elevated conveyor extending into the Columbia River in Columbia County, Oregon. The elevated conveyor, which will extend 485.5 feet into the river (from the ordinary high water elevation), is proposed for construction at a vacant property approximately 1.5 miles north of Columbia City (Township 5N, Range 1W, Section 21; tax lots 100, 300). The elevated conveyor will allow Morse Bros. to barge aggregate from quarries in Columbia County to the Portland area reducing truck traffic on Highway 30.

The construction of the elevated conveyor will require the installation of 14, 24-inch diameter hollow steel piles into the river, and 30 H piles, and the associated construction of a gravel-access road, a drive-over hopper for truck unloading/loading, and an aggregate stockpile. Installation of the piles will affect an area below the ordinary high water elevation of the Columbia River.

Access to the site is via an existing paved road that is used by Coastal Chemical to access their dock from Highway 30. The Coastal Chemical dock is approximately 1500 feet north of the proposed Morse Bros. elevated conveyor.

The paved access road will be widened approximately 10 feet to allow Morse Bros. trucks to safely travel from Highway 30 to the elevated conveyor facility. A 30-foot-wide gravel road will be constructed south of the existing road, which will loop through the project area and back to the access road. A minimum 200-foot untouched buffer will be retained between the constructed road and McBride Creek. A drainage swale will be created on the outside and inside edges of the crowned road to catch road runoff. No drainage outlets from the drainage swales will be constructed since it is expected that all runoff will filter into the porous sandy dredge spoils. Thus, there will be no sediment-laden sheet or conveyed overland flow to enter the Columbia River or McBride Creek.

Within the interior loop of the road, Morse Bros. will construct a stockpile area where, if necessary, aggregate may occasionally be stored before loading on a barge. Trucks carrying aggregate to the facility will unload their aggregate into a 16-foot-wide hopper. The hopper will deposit the aggregate onto the first of two elevated conveyors. The first conveyor is 410 feet 10 inches long, and extends from the hopper to an area above the ordinary high water elevation. At the terminus of the first elevated conveyor, the aggregate will be deposited onto a second elevated conveyor that will extend 485.5 feet from the ordinary high water elevation into the Columbia River. This elevated conveyor will be 15.5 feet wide and will include two catwalks and the conveyor belt. The conveyor will transport aggregate to the end of the dock, where it will empty into the center of a barge via a lifting and telescoping conveyor. The barges will be pulled along a 450-foot-long perpendicular dock extension. The conveyors will have wind skirts and wipers to minimize spillage and dust. An additional gravel diverter will be installed on the first conveyor. This diverter, to be utilized in the future, is designed to work with a radial tracker to allow aggregate stockpiling alongside the elevated conveyor. With some minimal fill on the edge closest to the river, the entire stockpile area will be 1 foot above the 100-year floodplain at 22 feet Columbia River Datum (CRD).

The construction of the elevated conveyor facility will take place during the Columbia River in-water work period between November 1st and February 28th. Before work onsite, silt containment fences will be installed along the perimeter of the work area. The fences will contain windblown sediment and demarcate areas for truck exclusion. Vegetation removal associated with the construction will be limited to a 30-foot-wide area along the access road connecting the elevated conveyor to the hopper. The only in-water work proposed with this application is associated with driving 44 piles into the riverbed below ordinary high water. The piles will be installed via a barge. The conveyor platform is preconstructed and will be lowered into place and fastened to the pilings via barges. The total time for work associated with the construction of the dock is approximately 60 days, and it will take less than 30 days to drive the piles into the river.

The elevated conveyor will be used by Morse Bros. throughout the year. Loss of aggregate as it is transported along the conveyor will be minimal due to a belt skirt and wipes, which will ensure that smaller material is captured in a trough before discharge into a barge. In addition, the discharge into the barges will be accomplished through a vertical funnel, which will also ensure minimal loss of aggregate.

Table 1. References for Additional Background on Listing Status, Biological Information, Protective Regulations, and Critical Habitat Elements for the ESA-Listed Species Considered in this Opinion.

Species ESU	Status	Critical Habitat[1]	Protective Regulations	Biological Information, Historical Population Trends
Chinook salmon (*O. Tshawytscha*)				
Snake River fall-run	T 4/22/92; 57 FR 14653[2]	12/28/93; 58 FR 68543	7/10/00; 65 FR 42422	Waples *et al.* 1991b; Healey 1991
Snake River spring/summer-run	T 4/22/92; 57 FR 14653[2]	10/25/99; 64 FR 57399[3]	7/10/00; 65 FR 42422	Matthews and Waples 1991; Healey 1991
Lower Columbia River	T 3/24/99; 64 FR 14308		7/10/00; 65 FR 42422	Myers *et al.*1998; Healey 1991
Upper Willamette River	T 3/24/99; 64 FR 14308		7/10/00; 65 FR 42422	Myers *et al.*1998; Healey 1991
Upper Columbia River spring-run	E 3/27/99; 64 FR 14308		7/10/00; 65 FR 42422	Myers *et al.*1998; Healey 1991
Chum salmon (*O. keta*)				
Columbia River	T 3/25/99; 64 FR 14508		7/10/00; 65 FR 42422	Johnson *et al.* 1997; Salo 1991
Sockeye salmon (*O. nerka*)				
Snake River	E 11/20/91; 56 FR 58619	12/28/93; 58 FR 68543	11/20/91; 56 FR 58619	Waples *et al.* 1991a; Burgner 1991
Steelhead (*O. mykiss*)				
Lower Columbia River	T 3/19/98; 63 FR 13347		7/10/00; 65 FR 42422	Busby *et al.* 1995; 1996
Middle Columbia River	T 3/25/99; 64 FR 14517		7/10/00; 65 FR 42422	Busby *et al.* 1995; 1996
Upper Columbia River	E 8/18/97; 62 FR 43937		7/10/00; 65 FR 42422	Busby *et al.* 1995; 1996
Upper Willamette River	T 3/25/99; 64 FR 14517		7/10/00; 65 FR 42422	Busby *et al.* 1995; 1996
Snake River Basin	T 8/18/97; 62 FR 43937		7/10/00; 65 FR 42422	Busby *et al.* 1995; 1996

[1] Critical habitat designations (excluding Snake River chinook and sockeye salmon) were vacated and remanded on May 7, 2002, by a Federal Court

[2] Also see 6/3/92; 57 FR 23458, correcting the original listing decision by refining ESU ranges.

[3] This corrects the original designation of 12/28/93 (58 FR 68543) by excluding areas above Napias Creek Falls, a naturally-impassable barrier.

2. ENDANGERED SPECIES ACT

2.1 Biological Opinion

2.1.1 Biological Information and Critical Habitat

The action area is defined by NOAA Fisheries regulations (50 CFR 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area includes designated critical habitats affected by the proposed action within the Columbia River. The action area is the Columbia River adjacent to the work area and downstream 300 feet (expected limit of turbidity and potential sound effects). Essential habitat features for salmonids are: Substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food (juvenile only), riparian vegetation, space, and safe passage conditions. The proposed action may affect the essential habitat features of water quality and substrate. The proposed action would occur within designated critical habitats for Snake River steelhead, sockeye and chinook salmon.

The Columbia River within the action area serves as a migration area for all listed species under consideration in this Opinion. It may also serve as a feeding and rearing area for juvenile steelhead and chinook salmon. References for further background on listing status and biological information can be found in Table 1.

According to a recent draft of "Preliminary conclusions regarding the updated status of listed evolutionarily significant units (ESUs) of West Coast salmon and steelhead,"drafted by the West Coast Salmon Biological Review Team (BRT), several ESUs are in danger of extinction or likely to become endangered (NMFS 2003). For the following ESUs, the majority BRT conclusion was "in danger of extinction": UCR spring-run chinook, UCR steelhead, LCR coho and SR sockeye. For the following ESUs, the majority BRT conclusion was "likely to become endangered in the foreseeable future": SR fall-run chinook, SR spring/summer-run chinook, LCR chinook, UWR chinook, SR steelhead, MCR steelhead, LCR steelhead, UWR steelhead and LCR chum.

Overall, although recent increases in escapement were considered a favorable sign by the BRT, the response was uneven across ESUs and, in some cases, across populations within ESUs. Furthermore, in most instances in which recent increases have occurred, they have not yet been sustained for even a full salmon/steelhead generation. The causes for the increases are not well understood, and in many (perhaps most) cases may be due primarily to unusually favorable conditions in the marine environment rather than more permanent alleviations in the factors that led to widespread declines in abundance over the past century. In general, the BRT felt that ESUs and populations would have to maintain themselves for a longer period of time at levels considered viable before it could be concluded that they are not at significant continuing risk.

2.1.2 Evaluating the Proposed Actions

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitat. This analysis involves the initial steps of defining the biological requirements of the listed species, and evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries must consider the estimated level of mortality attributable to: (1) Collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed species' life stages that occur beyond the action area. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

NOAA Fisheries also evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' critical habitat. NOAA Fisheries must determine whether habitat modifications appreciably diminish the value of critical habitat for both survival and recovery of the listed species. NOAA Fisheries identifies those effects of the action that impair the function of any essential element of critical habitat. NOAA Fisheries then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NOAA Fisheries concludes that the action will adversely modify critical habitat, it must identify any reasonable and prudent alternatives available.

For the proposed action, NOAA Fisheries' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NOAA Fisheries' critical habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for migration, spawning, and rearing of the listed species under the existing environmental baseline.

2.1.2.1 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying the ESA section 7(a)(2) to listed salmonids is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species taking into account population size, trends, distribution and genetic diversity. To assess to the current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species for ESA protection and also considers new data available that is relevant to the determination.

The relevant biological requirements are those necessary for the listed species to survive and recover to a naturally-reproducing population level, at which time protection under the ESA would become

unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance its capacity to adapt to various environmental conditions, and allow it to become self-sustaining in the natural environment.

For this consultation, the biological requirements are improved habitat characteristics that function to support successful rearing and migration. The current status of the listed species, based upon their risk of extinction, has not significantly improved since the species were listed.

2.1.2.2 Environmental Baseline

The most recent evaluation of the environmental baseline for the Columbia River is part of the NOAA Fisheries's Opinion for the Federal Columbia River Power System (FCRPS) issued in December 2000. This Opinion assessed the entire Columbia River system below Chief Joseph Dam, and downstream to the farthest point (the Columbia River estuary and nearshore ocean environment) at which listed salmonids are influenced. A detailed evaluation of the environmental baseline of the Columbia River basin can be found in the FCRPS Opinion
(NMFS 2000).

The quality and quantity of freshwater habitats in much of the Columbia River basin have declined dramatically in the last 150 years. Forestry, farming, grazing, road construction, hydrosystem development, mining, and urbanization have radically changed the historical habitat conditions of the basin. Depending on the species, they spend from a few days to one or two years in the Columbia River and its estuary before migrating out to the ocean and another one to four years in the ocean before returning as adults to spawn in their natal streams.

Water quality in streams throughout the Columbia River basin has been degraded by human activities such as dams and diversion structures, water withdrawals, farming and grazing, road construction, timber harvest activities, mining activities, and urbanization. Tributary water quality problems contribute to poor water quality where sediment and contaminants from the tributaries settle in mainstem reaches and the estuary. Temperature alterations also affect salmonid metabolism, growth rate, and disease resistance, as well as the timing of adult migrations, fry emergence, and smoltification. Many factors can cause high stream temperatures, but they are primarily related to land-use practices rather than point-source discharges. Loss of wetlands and increases in groundwater withdrawals have contributed to lower base-stream flows, which in turn contribute to temperature increases. Channel widening and land uses that create shallower streams also cause temperature increases.

Pollutants also degrade water quality. Salmon require clean gravel for successful spawning, egg incubation, and emergence of fry. Fine sediments clog the spaces between gravel and restrict the flow of oxygen-rich water to the incubating eggs. Excess nutrients, low levels of dissolved oxygen, heavy metals, and changes in pH also directly affect the water quality for salmon and steelhead.

Water quantity problems are also a significant cause of habitat degradation and reduced fish production. Withdrawing water for irrigation, urban, and other uses can increase temperatures,

smolt travel time, and sedimentation. Return water from irrigated fields can introduce nutrients and pesticides into streams and rivers. On a larger landscape scale, human activities have affected the timing and amount of peak water runoff from rain and snowmelt. Many riparian areas, flood plains, and wetlands that once stored water during periods of high runoff have been developed. Urbanization paves over or compacts soil and increases the amount and concentration of runoff reaching rivers and streams.

Based on the best available information regarding the current status of the listed species range-wide, the population status, trends, genetics, and the poor environmental baseline conditions within the action areas, NOAA Fisheries concludes that the biological requirements of these species are not currently being met. Degraded habitat resulting from agricultural practices, forestry practices, road building, and residential construction indicate many aquatic habitat indicators are not properly functioning within the Columbia River basin. Actions that do not maintain or restore properly functioning aquatic habitat conditions would be likely to jeopardize the continued existence of these species.

2.1.3 Analysis of Effects

2.1.3.1 Effects of Proposed Action

Potential impacts to listed salmonids from the proposed action include both direct and indirect effects. Potential indirect effects include turbidity, deleterious sound pressure waves and a reduction in available substrate from driving piles. Potential direct effects include possible mortality from increased densities of predatory fish using the new structure as cover.

The effects of suspended sediment and turbidity on fish reported in the literature range from beneficial to detrimental. Elevated total suspended solids (TSS) conditions have been reported to enhance cover conditions, reduce piscivorous fish/bird predation rates, and improve survival. Elevated TSS conditions have also been reported to cause physiological stress, reduce growth, and adversely affect survival. Of key importance in considering the detrimental effects of TSS on fish are the frequency and the duration of the exposure, not just the TSS concentration.

Behavioral avoidance of turbid waters may be one of the most important effects of suspended sediments (DeVore *et al.* 1980, Birtwell *et al.* 1984, Scannell 1988). Salmonids have been observed to move laterally and downstream to avoid turbid plumes (Sigler *et al.* 1984, Lloyd 1987, Scannell 1988, Servizi and Martens 1991). Juvenile salmonids avoid streams that are chronically turbid, such as glacial streams or those disturbed by human activities, unless the fish need to traverse these streams along migration routes (Lloyd *et al.* 1987).

Fish that remain in turbid, or elevated TSS, waters experience a reduction in predation from piscivorous fish and birds (Gregory and Levings 1998). In systems with intense predation pressure, this provides a beneficial tradeoff (*e.g.*, enhanced survival) to the cost of potential physical effects (*e.g.*, reduced growth). Turbidity levels of about 23 nephalometric turbidity units (NTU) have been found to minimize bird and fish predation risks (Gregory 1993). Exposure duration is a critical

determinant of the occurrence and magnitude of physical or behavioral effects (Newcombe and MacDonald 1991). Salmonids have evolved in systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with flood events, and are adapted to such high pulse exposures. Adult and larger juvenile salmonids appear to be little affected by the high concentrations of suspended sediments that occur during storm and snowmelt runoff episodes (Bjornn and Reiser 1991). However, research shows that chronic exposure can cause physiological stress responses that can increase maintenance energy and reduce feeding and growth (Redding *et al.* 1987, Lloyd 1987, Servizi and Martens 1991).

NOAA Fisheries anticipates that turbidity generated from pile driving will be limited in both space and time and confined to the area close to the operation. NOAA Fisheries does not expect direct lethal take to occur because of turbidity. The work area will be isolated with a curtain around the dock. NOAA Fisheries expects that some individual chinook salmon and steelhead (both adult and juvenile) may be harassed by turbidity plumes when the curtain is removed, but could easily avoid potential plumes. Indirect lethal take could occur if individual juvenile fish are forced (*i.e.*, out of the work area) into an area where they may be preyed upon.

Benthic invertebrates in shallow water habitats are key food sources for juvenile salmonids during their outmigration (McCabe *et al.* 1996). The proposed new piles will eliminate substrate available to benthic aquatic organisms and therefore, eliminate a possible food source for juvenile salmonids in the project area. While quantifying the impact this has on salmon populations is difficult, NOAA Fisheries suspects that some impact on chinook and steelhead productivity may occur from suppression of benthic prey species.

Pile driving often generates intense sound pressure waves that can injure or kill fish (Reyff 2003, Abbott and Bing-Sawyer 2002, Caltrans 2001, Longmuir and Lively 2001, Stotz and Colby 2001). The type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water, and the type and size of the pile-driving hammer all influence the sounds produced during pile driving. Sound pressure is positively correlated with the size of the pile because more energy is required to drive larger piles. Wood and concrete piles produce lower sound pressures than hollow steel piles of a similar size, and may be less harmful to fishes. Firmer substrates require more energy to drive piles and produce more intense sound pressures. Sound attenuates more rapidly with distance from the source in shallow than in deep water (Rogers and Cox 1988). Impact hammers produce intense, sharp spikes of sound that can easily reach levels that harm fishes, and the larger hammers produce more intense sounds. Vibratory hammers, on the other hand, produce sounds of lower intensity, with a rapid repetition rate.

Sound pressure levels (SPLs) greater than 150 decibels (dB) root mean square (RMS) produced when using an impact hammer to drive a pile have been shown to affect fish behavior and cause physical harm when peak SPLs exceed 180 dB (re: 1 microPascal). Surrounding the pile with a bubble curtain can attenuate the peak SPLs by approximately 20 dB and is equivalent to a 90% reduction in sound energy. However, a bubble curtain may not bring the peak and RMS SPLs below the established thresholds, and take may still occur. Without a bubble curtain, SPLs from driving 12-inch diameter steel pilings, measured at 10 meters, may reach 205 dB_{peak} (Pentec 2003)

and 185 dB_{rms}. With a bubble curtain, SPLs may be reduced to 185 dB_{peak} and 165 dB_{rms}. Using the spherical spreading model to calculate attenuation of the pressure wave (TL = 50*log(R1/R2)), physical injury to sensitive species and life-history stages may occur up to 18 meters from the pile driver, and behavioral effects up to 56 meters. Studies on pile driving and underwater explosions suggest that, besides attenuating peak pressure, bubble curtains also reduce the impulse energy and, therefore, the potential for injury (Keevin 1998). Because sound pressure attenuates more rapidly in shallow water (Rogers and Cox 1988), it may have fewer deleterious effects there.

Fish respond differently to sounds produced by impact hammers than they do to sounds produced by vibratory hammers. Fish consistently avoid sounds like those of a vibratory hammer (Enger *et al.* 1993; Dolat 1997; Knudsen *et al.* 1997; Sand *et al.* 2000) and appear not to habituate to these sounds, even after repeated exposure (Dolat, 1997; Knudsen *et al.* 1997). On the other hand, fish may respond to the first few strikes of an impact hammer with a 'startle' response, but then the startle response wanes and some fish remain within the potentially-harmful area (Dolat 1997). Compared to impact hammers, vibratory hammers make sounds that have a longer duration (minutes vs. milliseconds) and have more energy in the lower frequencies (15-26 Hz vs. 100-800 Hz) (Würsig, *et al.* 2000; Carlson *et al.* 2001; Nedwell and Edwards 2002).

Air bubble systems can reduce the adverse effects of underwater sound pressure levels on fish. Whether confined inside a sleeve made of metal or fabric or unconfined, these systems have been shown to reduce underwater sound pressure (Wursig *et al.* 2000; Longmuir and Lively 2001; Christopherson and Wilson 2002; Reyff and Donovan 2003). Unconfined bubble curtains lower sound pressure by as much as 17 dB (85%) (Wursig *et al.* 2000, Longmuir and Lively 2001), while bubble curtains contained between two layers of fabric reduce sound pressure up to 22 dB (93%) (Christopherson and Wilson, 2002). However, an unconfined bubble curtain can be disrupted and rendered ineffective by currents greater than 1.15 miles per hour (Christopherson and Wilson, 2002). When using an unconfined air bubble system in areas of strong currents, it is essential that the pile be fully contained within the bubble curtain, and that the curtain have adequate air flow, and horizontal and vertical ring spacing around the pile.

Juvenile salmonids occur year round in waters covered by this Opinion. However, the potential for take resulting from pile driving and removal will be minimized by completing the work during preferred in water work windows, using a vibratory hammer where possible, and using sound attenuators where an impact hammer is necessary.

To the extent that vegetation is providing habitat function, such as delivery of large wood, particulate organic matter, or shade to a riparian area and stream, root strength for slope and bank stability, and/or sediment filtering and nutrient absorption from runoff, removal of that vegetation for construction will reduce or eliminate those habitat values (Darnell 1976, Spence *et al.* 1996). Denuded areas lose organic matter and dissolved minerals such as nitrates and phosphates. Microclimate can become drier and warmer with corresponding increases in wind speed, and soil and water temperature. Water tables and spring flow can be reduced. Loose soil can temporarily accumulate in the construction area. In dry weather, this soil can be dispersed as dust. In wet

weather, loose soil is transported to streams by erosion and runoff, particularly in steep areas. Erosion and runoff increase the supply of soil to lowland drainage areas and eventually to aquatic habitats where they increase water turbidity and sedimentation. This combination of erosion and mineral loss can reduce soil quality and site fertility in upland and riparian areas. Concurrent in-water work can compact or dislodge channel sediments, thus increasing turbidity and allowing currents to transport sediment downstream where it is eventually redeposited. Continued operations when the construction site is inundated can significantly increase the likelihood of severe erosion and contamination.

The proposed project includes vegetation removal for construction of the conveyor. Vegetation will be cleared for 10 feet on each side of the conveyor. An equivalent area of native riparian vegetation will be planted by the applicant on site, near the shores of the Columbia River and McBride Creek to help provide functional riparian vegetation to the project area.

2.1.3.2 Effects on Critical Habitat

NOAA Fisheries designates critical habitat based on physical and biological features that are essential to the listed species. Critical habitat is currently designated in the project area for SR sockeye, SR steelhead, and SR fall-run and spring/summer-run chinook salmon. Essential features of the area for listed salmon are: Substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food (juvenile only), riparian vegetation, space, and safe passage conditions (50 CFR 226). Effects to critical habitat from these categories are included in the effects description expressed above in section 2.1.3.1.

2.1.3.3 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as those effects of "future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes. Therefore, these actions are not considered cumulative to the proposed action.

NOAA Fisheries is not aware of any specific future non-Federal activities within the action area that would cause greater impacts to listed species than presently occurs. NOAA Fisheries assumes that future private and state actions will continue at similar intensities as in recent years.

2.1.4 Conclusion

NOAA Fisheries believes that the proposed action will cause a minor, short-term degradation of anadromous salmonid habitat due to increased turbidity, sound pressure wave effects and possible reduction in benthic prey species. However, NOAA Fisheries has determined, based on the available information, that the proposed action covered in this Opinion is not likely to jeopardize the continued existence of listed salmonids or destroy or adversely modify designated critical

habitat(s) of Snake River stocks. NOAA Fisheries used the best available scientific and commercial data to apply its jeopardy analysis. Our determination is based on these findings: (1) Work will be done during the in-water work window; (2) all removed vegetation will be replaced on-site; (3) sound effects of pile driving will be reduced through the use of sound attenuation devices; (4) effects of turbidity will be short in duration and limited in space; and (5) small pile size limits unavailable substrate for prey species.

2.1.5 Reinitiation of Consultation

This concludes formal consultation on these actions in accordance with 50 CFR 402.14(b)(1). Reinitiation of consultation is required: (1) If the amount or extent of incidental take is exceeded; (2) if the action is modified in a way that causes an effect on the listed species that was not previously considered in the BA and this Opinion; (3) new information or project monitoring reveals effects of the action that may affect the listed species in a way not previously considered; (4) a new species is listed that may be affected by the action; or (5) new critical habitat rulemaking results in the designation of critical habitat that may be affected by the action (50 CFR 402.16).

2.2 Incidental Take Statement

Section 9 and rules promulgated under section 4(d) of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, and sheltering. "Harass" is defined as actions that create the likelihood of injuring listed species by annoying it to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. "Incidental take" is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement

An incidental take statement specifies the impact of any incidental taking of threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.2.1 Amount or Extent of the Take

NOAA Fisheries anticipates that the action covered by this Opinion is reasonably certain to result in incidental take resulting from turbidity, sound effect from pile driving and reduction in prey source from loss of available substrate. Even though NOAA Fisheries expects some low level, non-lethal incidental take to occur due to the action covered by this Opinion, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific

amount of incidental take to the species itself. In instances such as these, NOAA Fisheries designates the expected amount of take as "unquantifiable". Based on the information provided by the COE and other available information, NOAA Fisheries anticipates that an unquantifiable amount of incidental take could occur as a result of the action covered by this Opinion.

The extent of the take is limited to turbidity and decrease of substrate resulting from pile driving by Morse Bros. in the Columbia River. The extent of the take includes the substrate and water column of the Columbia River, and downstream to the extent of visible short-term turbidity increases resulting from the project work. If the proposed project or project area changes, consultation will be reinitiated to evaluate the effect of changes in the project to listed species.

2.2.2 Reasonable and Prudent Measures

NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to avoid or minimize take of listed salmonid species resulting from the action covered by this Opinion. The COE shall include measures in any permit issued for the proposed action that will:

1. Minimize incidental take from general construction by excluding unauthorized permit actions and applying permit conditions that avoid or minimize adverse effects to riparian and aquatic systems.

2. Complete a comprehensive monitoring and reporting program to ensure implementation of these conservation measures are effective at minimizing the likelihood of take from permitted activities.

2.2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the COE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To implement reasonable and prudent measure #1 (general conditions for construction, operation and maintenance), the COE shall ensure that:

    a. Timing of in-water work. Work within the active channel will be completed during the preferred in-water work period of November 1 - February 28, unless otherwise approved in writing by NOAA Fisheries.
    b. Pollution and Erosion Control Plan. A pollution and erosion control plan will be prepared and carried out to prevent pollution related to construction operations. The plan must be available for inspection on request by the COE or NOAA Fisheries.
        i. Plan Contents. The pollution and erosion control plan must contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.

(1) Practices to prevent erosion and sedimentation associated with access roads, stream crossings, construction sites, borrow pit operations, haul roads, equipment and material storage sites, fueling operations and staging areas.

(2) Practices to confine, remove and dispose of excess concrete, cement and other mortars or bonding agents, including measures for washout facilities.

(3) A description of any hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.

(4) A spill containment and control plan with notification procedures, specific clean up and disposal instructions for different products, quick response containment and clean up measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

(5) Practices to prevent construction debris from dropping into any stream or water body, and to remove any material that does drop with a minimum disturbance to the streambed and water quality.

ii. Inspection of erosion controls. During construction, all erosion controls must be inspected daily during the rainy season and weekly during the dry season to ensure they are working adequately.[4]

(1) If inspection shows that the erosion controls are ineffective, work crews must be mobilized immediately to make repairs, install replacements, or install additional controls as necessary.

(2) Sediment must be removed from erosion controls once it has reached 1/3 of the exposed height of the control.

c. Preconstruction activity. Before significant[5] alteration of the project area, the following actions must be completed:

i. Marking. Flag the boundaries of clearing limits associated with site access and construction to prevent ground disturbance of critical riparian vegetation, wetlands and other sensitive sites beyond the flagged boundary.

ii. Emergency erosion controls. Ensure that the following materials for emergency erosion control are onsite:

(1) A supply of sediment control materials (*e.g.*, silt fence, straw bales[6]).

(2) An oil-absorbing floating boom whenever surface water is present.

iii. Temporary erosion controls. All temporary erosion controls must be in-place and appropriately installed downslope of project activity within the riparian area until site restoration is complete.

d. Heavy Equipment. Use of heavy equipment will be restricted as follows:

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[4] "Working adequately" means no turbidity plumes are evident during any part of the year.

[5] "Significant" means an effect can be meaningfully measured, detected or evaluated.

[6] When available, certified weed-free straw or hay bales must be used to prevent introduction of noxious weeds.

i. Vehicle staging. Vehicles must be fueled, operated, maintained and stored as follows:

(1) Vehicle staging, cleaning, maintenance, refueling, and fuel storage must take place in a vehicle staging area placed 150 feet or more from any stream, water body or wetland.

(2) All vehicles operated within 150 feet of any stream, water body or wetland must be inspected daily for fluid leaks before leaving the vehicle staging area. Any leaks detected must be repaired in the vehicle staging area before the vehicle resumes operation. Inspections must be documented in a record that is available for review on request by COE or NOAA Fisheries.

(3) All equipment operated instream must be cleaned before beginning operations below the bankfull elevation to remove all external oil, grease, dirt, and mud.

ii. Stationary power equipment. Stationary power equipment (*e.g.*, generators, cranes) operated within 150 feet of any stream, water body or wetland must be diapered to prevent leaks, unless otherwise approved in writing by NOAA Fisheries.

e. Piling installation. Install temporary and permanent pilings as follows:

i. Minimize the number and diameter of pilings, as appropriate, without reducing structural integrity.

ii. Repairs, upgrades, and replacement of existing pilings consistent with these terms and conditions are allowed.

iii. In addition to repairs, upgrades, and replacements of existing pilings, up to five single pilings or one dolphin consisting of three to five pilings may be added to an existing facility per in-water construction period.

iv. Drive each piling as follows to minimize the use of force and resulting sound pressure.

(1) When impact drivers will be used to install a pile, use the smallest driver and the minimum force necessary to complete the job. Use a drop hammer or a hydraulic impact hammer, whenever feasible and set the drop height to the minimum necessary to drive the piling.

(2) When using an impact hammer to drive or proof steel piles, one of the following sound attenuation devices will be used to reduce sound pressure levels by 20 decibels.

(a) Place a block of wood or other sound dampening material between the hammer and the piling being driven.

(b) If currents are 1.7 miles per hour or less, surround the piling being driven by an unconfined bubble curtain that will distribute small air bubbles around 100% of the piling perimeter for the full depth of the water column.[7]

[7] For guidance on how to deploy an effective, economical bubble curtain, see, Longmuir, C. and T. Lively, *Bubble Curtain Systems for Use During Marine Pile Driving*, Fraser River Pile and Dredge LTD, 1830 River Drive, New Westminster, British Columbia, V3M 2A8, Canada. Recommended components include a high volume air compressor

(c) If currents greater than 1.7 miles per hour, surround the piling being driven by a confined bubble curtain (*e.g.*, a bubble ring surrounded by a fabric or metal sleeve) that will distribute air bubbles around 100% of the piling perimeter for the full depth of the water column.

(d) Other sound attenuation devices as approved in writing by NOAA Fisheries.

f. Piling removal. If a temporary or permanent piling will be removed, the following conditions apply.

i. Dislodge the piling with a vibratory hammer.

ii. Once loose, place the piling onto the construction barge or other appropriate dry storage site.

iii. If a treated wood piling breaks during removal, either remove the stump by breaking or cutting 3 feet below the sediment surface or push the stump in to that depth, then cover it with a cap of clean substrate appropriate for the site.

iv. Fill the holes left by each piling with clean, native sediments, whenever feasible.

2. To implement reasonable and prudent measure #2 (monitoring), the COE shall:

a. Implementation monitoring. Ensure that the permittee submits a monitoring report to the COE within 120 days of project completion describing the permittee's success meeting his or her permit conditions. Each project level monitoring report will include the following information:

i. Project identification

(1) Permittee name, permit number, and project name.

(2) Category of activity.

(3) Project location, including any compensatory mitigation site(s), by 5th field HUC and by latitude and longitude as determined from the appropriate USGS 7-minute quadrangle map.

(4) COE contact person.

(5) Starting and ending dates for work completed.

ii. Narrative assessment. A narrative assessment of the project's effects on natural stream function.

iii. Photo documentation. Photo of habitat conditions at the project and any compensation site(s), before, during, and after project completion.[8]

(1) Include general views and close-ups showing details of the project and project area, including pre and post construction.

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that can supply more than 100 pounds per square inch at 150 cubic feet per minute to a distribution manifold with 1/16 inch diameter air release holes spaced every 3/4 inch along its length. An additional distribution manifold is needed for each 35 feet of water depth.

[8] Relevant habitat conditions may include characteristics of channels, eroding and stable streambanks in the project area, riparian vegetation, water quality, flows at base, bankfull and over-bankfull stages, and other visually discernable environmental conditions at the project area, and upstream and downstream of the project.

(2) Label each photo with date, time, project name, photographer's name, and a comment about the subject.

b. Failure to provide timely monitoring causes Incidental Take Statement to expire. If the COE fails to provide specified monitoring information by the required date, NOAA Fisheries will consider that a modification of the action that causes an effect on listed species not previously considered and causes the Incidental Take Statement of this Opinion to expire.

c. NOTICE. If a sick, injured or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at 360.418.4246. The finder must take care in handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

3. MAGNUSON-STEVENS ACT

3.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2)).

- NOAA Fisheries must provide conservation recommendations for any Federal or s tate action that would adversely affect EFH (§305(b)(4)(A)).

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes

sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of EFH

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for Federally-managed fisheries within the waters of Washington, Oregon, and California. Designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and the upriver extent of saltwater intrusion in river mouths along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (370.4 km) (PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception to the Canadian border (PFMC 1999).

Detailed descriptions and identifications of EFH are contained in the fishery management plans for groundfish (PFMC 1998a), coastal pelagic species (PFMC 1998b), and Pacific salmon (PFMC 1999). Casillas *et al.* (1998) provides additional detail on the groundfish EFH habitat complexes. Assessment of the potential adverse effects to these species' EFH from the proposed action is based, in part, on these descriptions and on information provided by the COE.

3.3 Proposed Actions

The proposed action and action area are detailed above in sections 1.2 and 2.1.1 of this Opinion. The action area includes habitats that have been designated as EFH for various life-history stages of starry flounder (*Platichthys stellatus*) and chinook and coho salmon.

3.4 Effects of Proposed Action

As described in detail in section 2.1.3 of this Opinion, the proposed action may result in short-term adverse effects to a variety of habitat parameters. These adverse effects are decreased water quality (turbidity), sound effects from pile driving and loss of substrate.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action will adversely affect the EFH for Starry flounder and chinook and coho salmon.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the COE, it does not believe that these measures are sufficient to address the adverse impacts to EFH described above. However, the terms and conditions outlined in section 2.2.3 are generally applicable to the designated EFH species in section 3.3, and address these adverse effects. Consequently, NOAA Fisheries recommends that they be implemented as EFH conservation measures.

3.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The COE must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(k)).

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